

965.074



# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Electrical Connectors

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We, ALBERT & J. M. ANDERSON MANUFACTURING COMPANY, a corporation organised under the laws of the Commonwealth of Massachusetts, United States of America, of 289, A Street, Boston 10, Massachusetts, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an electrical connector and more particularly to an electrical connector adapted for assembly with like connectors to provide a bank thereof.

The invention has for an object to provide a novel and improved electrical connector of the character specified having novel provision for assembly one with another to form a bank of connectors in a simple and efficient manner.

The invention has for another object to provide a novel and improved connector of the character specified having novel provision for modular assembly side by side and one on top of the other to form a bank of connectors adapted for engagement with like connectors of a second and similar bank in a simple and efficient manner.

With these general objects in view and such others as may hereinafter appear, the invention consists in the electrical connector adapted for modular assembly with like connectors to form a bank thereof as hereinafter described and particularly defined in the claims at the end of this specification.

In the accompanying drawings illustrating the preferred embodiment of the invention:

Fig. 1 is a plan view detail of an electrical connector insulating housing embodying the present invention;

Figs. 2 and 3 are end views of the same as seen from the left and right hand ends, respectively, of Fig. 1;

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Fig. 4 is a cross sectional view of a pair of identical single pole connectors joined together;

Fig. 5 is a cross sectional detail view of the insulating housing;

Fig. 6 is a plan view of a plurality of connectors assembled to form a bank thereof adapted for engagement with the connectors of a second and similar bank;

Fig. 7 is a front elevation of the same; and

Fig. 8 is an end view of the bank of connectors shown in Fig. 7.

In general, the present invention contemplates an improvement in the electrical connector illustrated and described in United States Patent No. 2,838,739, issued June 10, 1958. Such prior connectors are provided with an insulating housing which carries a rigid terminal member and which is adapted for longitudinal telescoping engagement with a second and identical connector. The insulating housing surrounds and encloses the terminal members for maximum insulating protection, and each terminal member is movably and yieldably mounted in the housing in a manner such that the terminal members are resiliently interlocked in their engaged position so as to provide an efficient electrical connection and so as to prevent inadvertent disengagement thereof during normal usage.

In accordance with the present invention provision is made for assembling the individual connectors side by side and one on top of the other to form a bank of a plurality of connectors for engagement with the connectors of a second and similar bank thereof. Provision is also made for locking the connectors in their assembled relation in the bank in a simple and convenient manner whereby to prevent inadvertent displacement thereof one with another.

Referring now to the drawings, and particularly to Figs. 1 to 5, the present invention is illustrated as embodied in an improved struc-

ture of connector of the type shown in United States Patent No. 2,838,739. The novel features of the illustrated connector, except as to the features herein claimed, from the subject matter of our copending application No. 26549/63 (Serial No. 965073). Hence, it will be understood that the novel features of the herein claimed invention may be embodied in other types of electrical connectors, the illustrated connector being used merely as an example of the type of connector in which the present invention may be embodied with advantage.

In general, the illustrated electrical connector comprises an elongated hollow one piece molded insulating housing 14 generally rectangular in cross sectional outline and adapted for telescopic engagement with a second and identical connector. Each connector is provided with a rigid terminal member 22 mounted in detached relation to the walls thereof. The contact end of each terminal member 22 is provided with a rounded or convex end portion projecting from one surface thereof for interlocking cooperation with the rounded end portion of the terminal member of a second connector, as illustrated in Fig. 4. A leaf spring 28 carried by the housing 14 is prestressed to resiliently bear against the opposite face of the forward end of the terminal member to maintain the terminal members of two engaged connectors in firm electrical contact. The free end of the leaf spring 28 is also arranged to engage a notch 26 formed in the contact end of the terminal member. When the rigid terminal member is inserted into the housing the free end of the leaf spring will snap into the notch so as to prevent withdrawal of the terminal member from the housing. Each terminal member is further provided with a cylindrical end portion 20 bored to receive the end of an electric cable 18 and into which the latter may be soldered.

In accordance with the present invention the elongated and substantially rectangular housing is constructed in a manner such as to permit the individual connectors to be assembled side by side and one on top of the other to form a modular assembly or bank of a plurality of connectors as shown in Figs. 6 to 8. As herein illustrated, opposite sides of each elongated housing 14 are provided with longitudinally extended dovetail tongues 65 and correspondingly shaped grooves 68, respectively, whereby one connector may be interlockingly engaged with another connector by inserting the tongue 66 of one connector into the groove 68 of a second connector and slidably seating the tongue in the groove to present the ends of the housings in flush relationship. The elongated tongues 66 and the correspondingly shaped grooves 68 are formed at the cable end of the housing and terminate in rounded end portions 70, 72, res-

pectively, at a point substantially medially of the ends of the housing as shown. The cable end of the groove 68 is open, and the rounded end portion 72 comprises the closed end thereof against which the rounded end 70 of the tongue 66 of a second connector is seated when assembled. The tongues and grooves are of equal length so that when assembled the ends of the assembled connectors will be in alignment as shown. With this construction it will be seen that any number of individual connectors 14 may be connected together side by side to form horizontal rows, or one upon the other to form vertical rows of connectors for cooperation with connectors similarly assembled in rows or tiers. Likewise, the connectors may be assembled side by side and one upon another to form a block or bank of connectors, as shown in Fig. 7, adapted for engagement with the connectors of a similar bank thereof to effect closing of a multiplicity of circuits simultaneously. Since all of the connectors are of a standard and uniform size and shape to form modular units, they may be used with advantage to produce a modular assembly of any number of connectors for cooperation with a similar assembly.

Provision is also made for locking the connectors or modular units together in their assembled relation in a manner such as to prevent longitudinal displacement one with another of the connectors in a bank of assembled connectors. As illustrated herein, each connector is provided with semicircular recesses 74, 76 on two opposite sides thereof so that when a group of connectors are assembled in rows or tiers to form a bank the semicircular portions 74, 76 are aligned to form circular openings through which rods 78 may be extended. The rods 78 may be frictionally retained in the openings or otherwise secured. As thus assembled, it will be seen that the rods prevent longitudinal displacement of the connectors one with another in a simple and efficient manner.

The forward end of each housing is provided with forwardly extended upper and lower portions 54, 56, respectively, the lower portion 56 comprising a forwardly extended terminal receiving pocket substantially U-shaped in cross section and closed at its forward end by an end wall 58. As shown in Figs. 4 and 5, the terminal receiving pocket is substantially coextensive with the inner walls of the cable opening and is preferably tapered towards its forward end. As illustrated, the exterior walls of the pocket are recessed or offset from the main body portion providing shouldered portions 60. In practice the contacting end of the terminal is inserted through the cable end of the housing to prevent the convex contacting portion 24 into the pocket, and during the inserting operation the end of the terminal member engages and presses

downwardly against the upwardly inclined portion of the leaf spring 28, and when the forward end of the terminal member passes beyond the free end of the leaf spring the spring will snap upwardly into the notch 26 to prevent withdrawal of the terminal member. The forwardly extended upper portion 54 of the insulating housing is coextensive with the body portion and shaped to provide an inverted U-shaped socket 62 open at its outer end and closed at its inner end by a transversely extended wall portion 64. The socket forming extension 54 extends over the terminal receiving pocket 56 and is of a size and shape such as to snugly receive the pocket 56 of a second and identical connector, as shown in Fig. 4, the outer end of the socket forming extension of one connector engaging the shouldered portions 60 of the second connector when the connectors are fully engaged. Also, when thus engaged, the closed end wall 58 of the pocket 56 of one connector engages with the transversely extended inner wall 64 of the socket of the second connector.

With this construction it will be seen that when two identical connectors are engaged by extending the pocket of one connector into the socket of a second connector, the rounded contacting faces 24 of each spring pressed terminal are slidably engaged by each other, initial inward movement of the connectors effecting downward movement of the terminals in their respective pockets against the leaf springs 28. Upon continued inward movement the high points of the curved portions pass by each other, and as the connectors approach full engagement the springs 28 effect upward movement of the terminals in their pockets to present the curved portions 24 in hooked or interlocking relation to each other as illustrated. It will thus be seen that a bank of individual connectors, as shown in Fig. 7, may be telescopically engaged with the individual connectors of a second and similar bank.

From the above description it will be seen that the present invention provides a novel and improved structure of electrical connector forming modular units adapted for convenient assembly with like connectors to produce a bank thereof and arranged to be engaged with like connectors of a similar bank in a simple and expedient manner.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

#### WHAT WE CLAIM IS:—

1. An electrical connector comprising an insulating housing having a terminal member mounted therein and adapted for electrical engagement with a second connector, opposite

sides of said housing being provided with tongues and grooves, respectively, adapted for mating engagement with the tongues and grooves of like connectors to produce an assembly of connectors adapted for electrical engagement with the connectors of a second and similar assembly.

2. An electrical connector comprising an insulating housing having a terminal member mounted therein and adapted for electrical engagement with a second connector, opposite sides of said housing being provided with tongues and grooves, respectively, adapted for mating engagement with the tongues and grooves of like connectors to produce an assembly of connectors adapted for electrical engagement with the connectors of a second and similar assembly, and means for locking the connectors in their assembled relation.

3. An electrical connector comprising an elongated insulating housing having a terminal member mounted therein and adapted for engagement with a second connector, opposite sides of said housing having longitudinally extended tongues and grooves, respectively, adapted for interlocking mating engagement with the tongues and grooves of like connectors to produce an assembly of connectors adapted for electrical engagement with the connectors of a second and similar assembly.

4. An electrical connector as defined in claim 3 wherein the tongues and grooves are dovetail shaped.

5. An electrical connector as defined in claim 3 wherein the housings are of uniform size and shape to provide modular units to produce a bank of connectors adapted for electrical engagement with the connectors of a similar bank.

6. An electrical connector as defined in claim 3 wherein the individual connectors of an assembly are identical in structure and are adapted for telescopic electrical engagement with the individual identical connectors of a second assembly.

7. An electrical connector as defined in claim 3 wherein the interlocking tongues and grooves are of equal length, said grooves being closed at one end for seating engagement with the corresponding end of the tongue of a second connector to align the ends of adjacent connectors in flush relation.

8. An electrical connector comprising an elongated insulating housing having a terminal member mounted therein and adapted for engagement with a second connector, opposite sides of said housing having longitudinally extended tongues and grooves, respectively, adapted for interlocking mating engagement with the tongues and grooves of like connectors to produce an assembly of connectors adapted for electrical engagement with the connectors of a second and similar assembly, said longitudinally extended interlocking

tongues and grooves being slidably engaged with the corresponding tongues and grooves of adjacent connectors in an assembly.

9. An electrical connector comprising an elongated insulating housing having a terminal member mounted therein and adapted for engagement with a second connector, opposite sides of said housing having longitudinally extended tongues and grooves, respectively adapted for interlocking mating engagement with the tongues and grooves of like connectors to produce an assembly of connectors adapted for electrical engagement with the connectors of a second and similar assembly, said longitudinally extended interlocking tongues and grooves being slidably engaged with the corresponding tongues and grooves of adjacent connectors in an assembly, and means for locking the connectors in their assembled relation to prevent longitudinal displacement of the assembled connectors relative to each other.

10. An electrical connector as defined in claim 9 wherein the locking means comprises means extended through transverse openings formed by adjacent connectors.

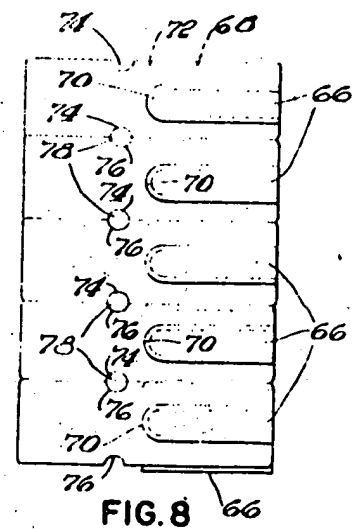
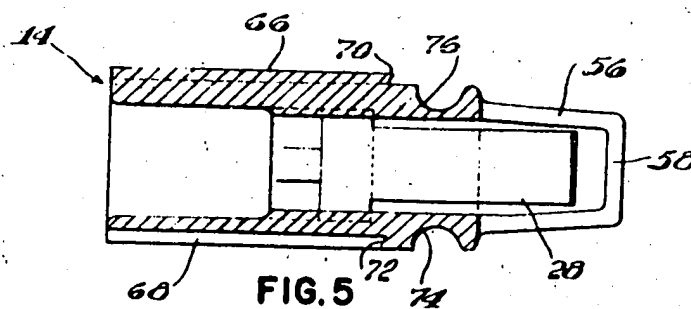
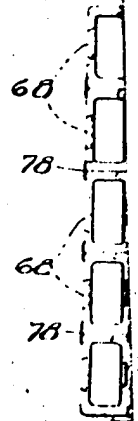
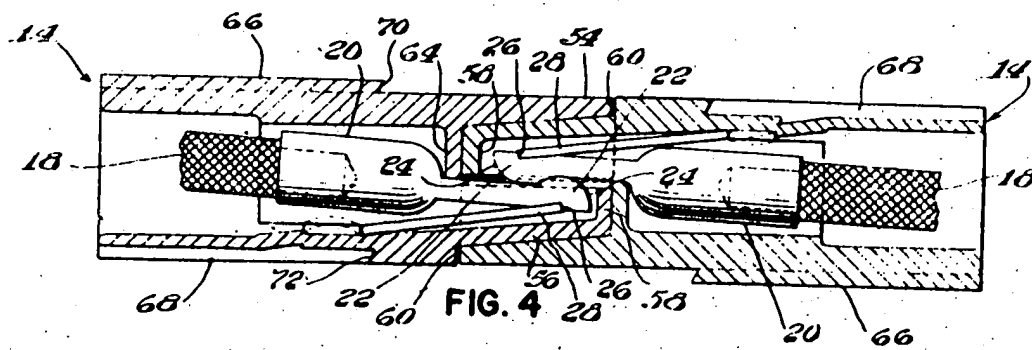
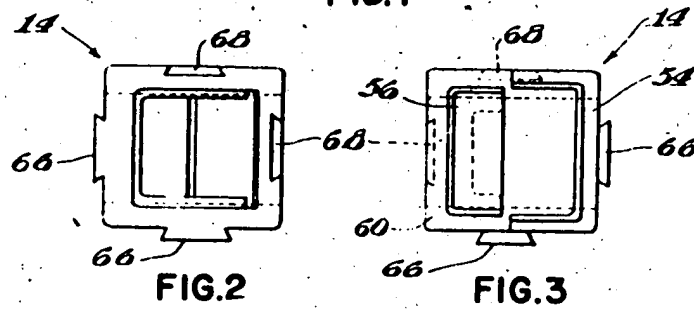
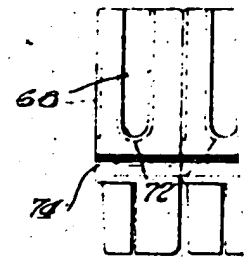
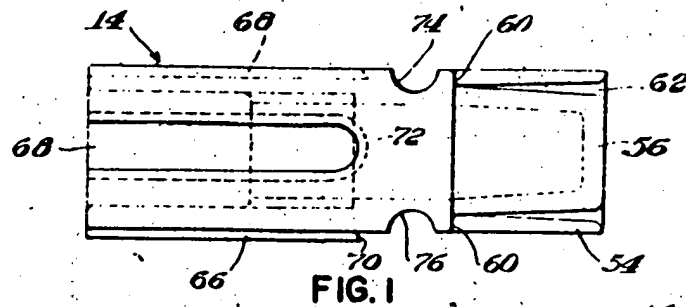
11. An electrical connector comprising an elongated molded one piece insulating housing having a terminal member mounted therein and adapted for electrical engagement with a second connector, said housing being substantially rectangular in cross section and having means molded in the side walls thereof adapted for interlocking engagement with like connectors to form a bank thereof, said bank being adapted for electrical engagement with the connectors of a second and similar bank.

12. An electrical connector comprising an

elongated molded one piece insulating housing substantially rectangular in cross section and having terminal members mounted therein adapted for telescopic electrical engagement with a second and identical connector, said housing having a cable end and a contact end, opposite sides of said housing being provided with molded longitudinally extended and dovetail shaped tongues and grooves, respectively, of equal length extending from the cable end and terminating at a point medially of the ends of the housing, said grooves being open at the cable end and closed at their inner ends, said tongues and grooves being slidably and interlockingly engageable with corresponding tongues and grooves of adjacent connectors to present the ends of the assembled connectors in flush alignment whereby to produce a bank of individual connectors assembled side by side and one upon another, said housings having transversely extended molded semicircular cutouts in the upper and lower sides thereof to form transversely extended circular openings in the assembled bank, and rods extending through said openings to prevent longitudinal displacement of the connectors relative to each other, said bank of identical connectors being adapted for telescopic electrical engagement with the connectors of a second and identical bank.

13. An electrical connector according to claim 1, substantially as hereinbefore described with reference to the drawings.

For the Applicants,  
D. YOUNG & CO.,  
Chartered Patent Agents,  
9 Staple Inn,  
London W.C.1.



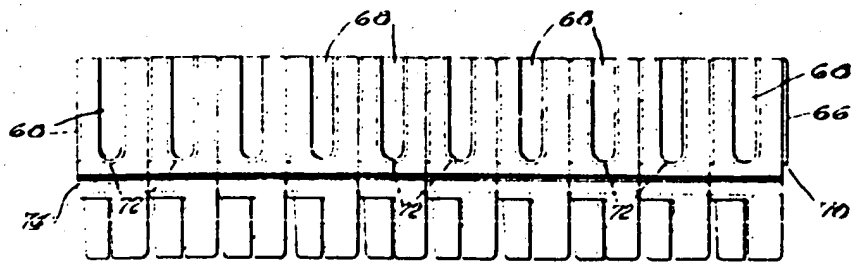
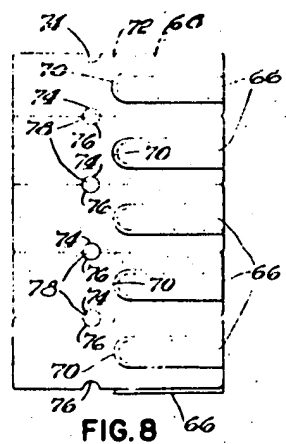
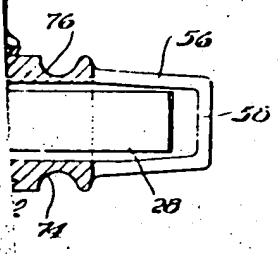
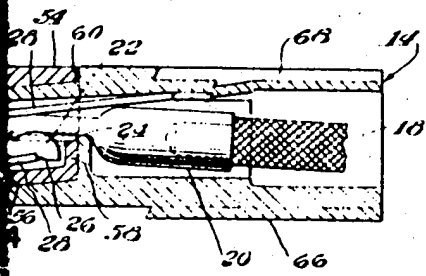
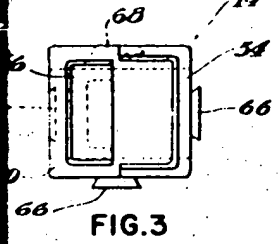
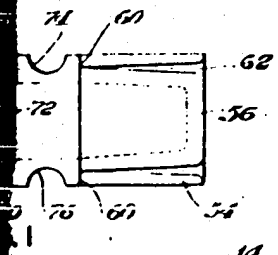


FIG. 6

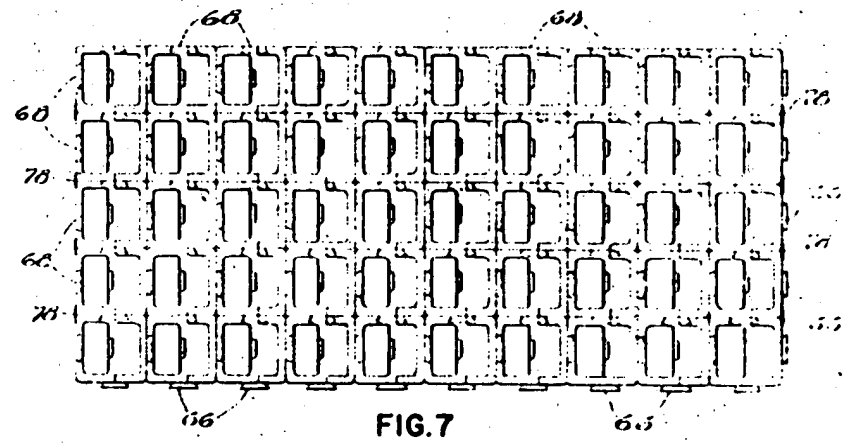


FIG. 7